

REMARKS

In response to the June 27, 2005 Office Action, the following is submitted:

By this Amendment, independent claims 1, 8, 14 and 21 have been amended. Thus, claims 1, 2, 4-9, 11-15, 17-19 and 21-24 are pending in the application. Claims 3, 10, 16 and 20 were previously canceled without prejudice or disclaimer.

All of the claims now present in the application have been rejected under 35 U.S.C. §103 as obvious over Ohtani et al. in view of Maeda for the reasons stated on pages 2-7 of the Office Action. It is submitted that the present claims are patentable over the prior art for the following reasons:

With regard to independent claims 1 and 14, the Examiner argues that Ohtani et al. “shows all of the elements of the claims except the alloy layer being an aluminum alloy and a diffusion prevention layer interposed between the aluminum alloy layer and each of the pair of titanium layers.” The Examiner then argues that Maeda teaches all of the elements deficient in Ohtani et al. and further argues that it would be obvious to add the features of Maeda to those of Ohtani et al. to produce a combination which purportedly meets the recited limitations of claims 1 and 14.

The Examiner has correctly noted that Ohtani et al. teaches a three-layer laminated structure of titanium/aluminum/titanium for the source wiring line and drain electrode of Ohtani et al. (See lines 10-13 of column 7 of Ohtani et al.)

However, lines 59-62 of column 6 of Ohtani et al. indicate that a film of aluminum or a material mainly containing aluminum is formed and patterned to form the gate wiring line of Ohtani et al.

Accordingly, it is submitted that Ohtani et al. teaches away from a three-layer laminated structure of titanium/aluminum alloy/titanium in that there is an inference that Ohtani's failure to indicate that an aluminum alloy can be used for the source wiring line and drain electrode after previously indicating that an aluminum or aluminum alloy can be used for the gate wiring line infers that Ohtani only considered pure aluminum for the source wiring line and drain electrode.

Furthermore, while Maeda indicates in lines 22-31 of column 4 thereof that the layer 36 is not limited to pure aluminum but rather can be an aluminum alloy, Maeda indicates in lines 62-64 of column 3 thereof that since the TiN layer 34 has a thickness sufficient to prevent the growth of alloy spikes, aluminum layer 36 need not contain silicon. Accordingly, there is an inference that the use of a TiN layer precludes the need for an aluminum alloy layer and allows the layer 36 to be pure aluminum.

In view of the above, it is submitted that it would not be obvious to combine the features of Ohtani et al. and Maeda.

With regard to claims 2 and 15, 9 and 22, the Examiner argues that while Maeda does not disclose the specifically recited weight percentage of the element in the alloy, it would be obvious to form the aluminum alloy having the desired percentage of an element. Applicants disagree with the unsupported allegations of the Examiner. In any event, it is submitted that these claims are patentable over the proposed combination of references in view of their dependency upon their parents claims.

Similarly, the Examiner has argues that with regard to claims 5 and 6, 12 and 24, the recited thickness of the titanium nitride layer would be obvious. Applicants disagree with the unsupported allegations of the Examiner. In any event, it is submitted that these claims are patentable over the proposed combination of references in view of their dependency upon their parents claims.

With regard to claims 4 and 11 and 23, 7 and 19, it is submitted that these claims are patentable over the proposed combination of references in view of their dependency upon their parents claims.

With regard to claims 17 and 18, 8 and 21, it is submitted that these claims are patentable over the proposed combination of references for the reasons noted above with regard to claims 1 and 14.

Furthermore, additionally with regard to claims 8 and 21, it is unclear whether the Examiner is applying Yamazaki et al. in stating that the recited interconnections not taught by Ohtani are a “well-known possible routing scheme”. Clarification thereof is respectfully requested.

In any event, with regard to the “well-known possible routing scheme” (emphasis added) of the Examiner, merely because elements from two different references can be combined does not infer that it would necessarily be obvious to do so.

Summarizing, in the Ohtani reference, an Al alloy is applied to the gate wiring line. The gate wiring line is a single-layered structure of Al alloy and not a multi-layered structure of Ti/Al alloy/Ti. In the Ohtani reference, the multi-layered structure is applied to the source/drain electrodes. However, the source/drain electrodes are formed by a structure of Ti/Al/Ti, and an Al alloy is not used for the source/drain electrodes. Furthermore, the triple layer structure of Ti/Al/Ti was already mentioned in the Background section of the present application.

The Al layer 36 of the Maeda reference does not need to contain Si when a TiN layer is placed between the Al layer 36 and the Ti layer 32. On the contrary, the Al alloy layer of the present invention contains one element of Si, Cu, Nd, Pt, and Ni, even when the diffusion prevention layer is placed between the Al alloy layer and Ti layer. In the Maeda reference, the TiN layer is placed between the Al layer and the Si substrate and is used as a barrier to prevent Al from diffusing into the Si substrate. However, in this case, boron contained in the Si substrate diffuses into the TiN layer, thereby making it impossible to obtain a good ohmic contact. Thus, the Ti layer of the Maeda reference is used for protecting the TiN layer of the TiN/Al structure (*see* column 1, line 28 - column 2, line 2).


On the other hand, the diffusion prevention layer of the present invention prevents Al and Ti from reacting with each other and forming a $TiAl_3$ alloy in the structure of Ti/Al alloy/Ti. The problem caused by the reaction between Al and Ti is not disclosed in either the Ohtani reference or the Maeda reference.

Additional references were cited by the Examiner but not utilized in the rejection of the claims, and accordingly, no further comment on these references is necessary.

No other issues remaining, reconsideration and favorable action upon all of the claims now present in the application is respectfully requested.

No fee is incurred by this Amendment.

Respectfully submitted,



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